

APPLICATION OF DIGITAL TRANSFORMATION IN TEACHING AND RESEARCH IN TRANSLATION AND INTERPRETING STUDIES

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Abstract: *The rapid development of digital technology has created both opportunities and challenges for higher education, particularly in Translation and Interpreting training. This study investigates the application of Artificial Intelligence (AI) and Virtual Reality (VR) to enhance teaching effectiveness and learning outcomes. The author proposes an “AI- and VR-Enhanced Translation and Interpreting Pedagogical Model,” integrating AI-based tools such as machine translation, computer-assisted translation tools, and speech recognition with VR simulations of real-life interpreting contexts. An experimental study was conducted with 60 third-year English-major students, divided into an experimental group and a control group over a 10-week period. The experimental group received instruction supported by AI and VR technologies, while the control group followed a traditional textbook-based approach. Data were analyzed using SPSS through pre- and post-tests. The results indicated a 31% improvement in the experimental group’s performance, significantly higher than the 11.2% improvement observed in the control group. These findings confirm the pedagogical effectiveness of integrating AI and VR, highlighting benefits such as reduced anxiety, immediate feedback, and enhanced professional skills. The study emphasizes the necessity of digital transformation in modern Translation and Interpreting education.*

Keywords: Artificial Intelligence (AI), Virtual Reality (VR), Translation and Interpreting Pedagogy, Digital Transformation in Education.

Received a manuscript: 10/02/2026; Edited: 12/02/2026; Reviewed: 16/02/2026; Paper accepted: 26/02/2026.

1. Introduction and Literature Review

1.1. Introduction: The Imperative for Digital Transformation

The global language services industry is undergoing profound transformation driven by Artificial Intelligence (AI) and immersive digital technologies. Advances in neural machine translation, AI-assisted post-editing, and Virtual Reality (VR) have shifted translation and interpreting (T&I) from a purely linguistic activity to a technology-mediated profession. This shift has exposed a growing misalignment between industry demands and traditional T&I pedagogical models, which remain largely theory-oriented and disconnected from professional realities. As a result, graduates may be linguistically competent but technologically underprepared.

This widening gap underscores the urgent need for digital transformation in T&I education. Rather than adding isolated technology modules, programs must rethink curriculum design to cultivate “techno-linguists” capable of integrating language expertise with digital proficiency. In response, this study proposes the model “AI and VR-Enhanced Translation and Interpreting Pedagogy”, which integrates AI and VR as core components of training.

The model pursues three objectives: enhancing professional competencies through contextualized practice; developing strategic proficiency in digital tools such as CAT software and machine translation; and fostering adaptive cognitive skills

through immersive VR simulations. By empirically testing this model within a Vietnamese university context, the study aims to provide an evidence-based framework for curriculum innovation aligned with global professional standards.

1.2. Literature Review

1.2.1. The Domestic Context: Gaps in Vietnamese T&I Education

In Vietnam, T&I is a common component of university English programs. However, the educational landscape remains fragmented. Scholars such as Lê (2017, 2018) and Hoàng (2020) highlight the absence of a unified, context-sensitive theoretical framework and the heavy reliance on imported textbooks that do not adequately address English - Vietnamese linguistic and cultural contrasts. This reliance often results in curricula that are insufficiently aligned with local professional realities.

A review of major domestic textbooks reveals persistent limitations. While works by Lưu Trọng Tuấn (2012) and Nguyễn Quốc Hùng (2014) offer valuable foundations in translation theory and interpreting techniques, they largely overlook digital competencies. Instruction on AI-assisted machine translation, CAT tool management, speech-to-text technologies, post-editing practices, and VR-based interpreting simulations is minimal or absent. Furthermore, essential contemporary issues—such as data security, terminology management in digital workflows, and ethical AI use—are rarely addressed.

This omission creates a significant disconnect between university training and the technology-saturated labor market. As noted by Phạm and Trần (2013), many graduates face difficulties transitioning into professional environments where digital tools are integral to daily practice. The lack of systematic digital integration within curricula therefore represents a critical gap in Vietnamese T&I education.

1.2.2. *International Perspectives: Integrating Technology into T&I Pedagogy*

Internationally, T&I education has increasingly shifted toward stronger professional alignment and innovation. Foundational scholarship-such as Nida and Taber's (1969) concept of dynamic equivalence, House's (2015) functional-pragmatic approach, and Munday's (2022) contemporary analyses-continues to shape theoretical understanding. However, technological integration has become central to modern practice. Research by Doherty and Kenny (2014) demonstrates how translation memory systems, CAT tools, and machine translation are now embedded in professional workflows, enhancing productivity while requiring new skill sets.

The current frontier involves AI and immersive technologies in pedagogy. AI is increasingly incorporated into learning processes, offering adaptive feedback, automated evaluation, and post-editing training. Post-editing competence-efficiently refining machine-generated output-has become a core industry skill. Meanwhile, VR has emerged as a powerful pedagogical tool. Studies such as Mellinger and Hanson (2023) show that VR simulations can recreate authentic interpreting environments (e.g., conference booths, courtrooms), allowing students to practice in low-risk yet high-immersion contexts, thereby improving confidence and performance.

Despite these innovations, scholars caution against technological determinism. Rico and Pastor (2022) stress that the "human factor" remains indispensable. The goal is not to replace translators or interpreters with machines but to cultivate hybrid professionals capable of critically, ethically, and strategically leveraging technology. Effective T&I education must therefore integrate theoretical knowledge, traditional skill development, and hands-on technological practice within a coherent pedagogical framework.

Overall, international discourse indicates that the future of T&I education lies in balanced integration rather than technological substitution. Applying this perspective to the Vietnamese context, the present study seeks to address domestic curricular gaps by systematically embedding AI tools and VR simulations within a structured training model. In doing so, it aims to bridge the academic-professional divide and align Vietnamese T&I education with

global standards in the era of digital transformation.

2. Methodology

This study employed a quantitative, quasi-experimental research design to assess the impact of an AI- and VR-integrated pedagogical model on the interpreting and listening skills of university students. The research was conducted over a structured 10-week period.

The participant sample consisted of 60 third-year undergraduate students majoring in Business and Tourism English at the Faculty of Foreign Languages, Phan Thiet University. Participants were randomly assigned to one of two groups: an Experimental Group (n=30) and a Control Group (n=30). Both groups were determined to have equivalent baseline English proficiency through an initial pre-test.

The Control Group received instruction following a traditional, textbook-based methodology using *Hospitality & Tourism* (Pearson).

The Experimental Group followed the same core syllabus but with integrated digital interventions. Their instruction incorporated the use of AI tools (ChatGPT, Google Translate for draft generation and analysis) and VR-based listening and interpreting practice. This practice utilized a curated set of 20 English-language VR video clips (e.g., from animated series and films) to simulate immersive comprehension and response scenarios.

The primary research instruments were parallel pre-test and post-test assessments. Each test required students to complete consecutive and simultaneous interpreting tasks based on audio-visual prompts, evaluating skills in accuracy, fluency, and speed. Data collected from these tests were analyzed using SPSS software (Version 26). Descriptive statistics were calculated to compare mean scores, and inferential statistics -specifically paired-sample t-tests and Independent Samples t-tests-were used to determine the statistical significance of performance differences within and between the two groups before and after the intervention. A significance level of $p < 0.05$ was adopted for all tests.

3. Results and Discussion

3.1. *Presentation of Results*

The quantitative analysis of pre-test and post-test data yielded clear and statistically significant results demonstrating the efficacy of the AI-VR integrated teaching model.

Pre-test Baseline: Analysis confirmed no significant difference in initial proficiency between the two groups. The mean pre-test score for the Experimental Group was 7.8 out of 20 items (39%), while the Control Group scored 7.5/20 (38%). Independent samples t-tests for the pre-test showed

Sig. (two-tailed) values of 0.071 and 0.070 (for equal variances assumed and not assumed, respectively), both exceeding the 0.05 threshold, confirming the groups were equivalent at the study's outset.

Post-test Performance: Following the 10-week intervention, a marked divergence in performance was observed. The Experimental Group's mean score rose to 13.8/20 items, representing a 69% success rate and a substantial 31% increase from their pre-test score. In contrast, the Control Group's mean post-test score was 10.7/20 (54%), reflecting only an 11.2% improvement.

Statistical Significance of Difference: The key finding lies in the between-groups comparison of post-test results. Independent samples t-tests on the post-test data produced Sig. (two-tailed) values of 0.0061 and 0.005. These values are decisively below the 0.05 significance level, providing strong statistical evidence that the performance improvement of the Experimental Group was significantly greater than that of the Control Group. This confirms that the observed positive effect can be attributed to the experimental treatment - the integration of AI and VR - rather than to chance or general learning over time.

3.2. Discussion of Findings

The results robustly support the central hypothesis that integrating AI and VR into T&I pedagogy leads to significantly better learning outcomes compared to traditional methods. The 31% gain by the Experimental Group versus the 11% gain by the Control Group underscores the pedagogical value of the proposed digital model.

3.2.1. Enhancing Engagement and Immersive Practice

A primary driver of the experimental group's success was the immersive and engaging nature of the VR components. Traditional listening exercises from textbooks can be abstract and decontextualized. In contrast, the VR video clips placed students inside visually rich, narrative-driven scenarios. This aligns with the principles of situated learning, where skills are developed within a context that mirrors their real-world application. Practicing interpreting within a simulated VR conference booth or a dynamic animated scene reduces the psychological distance between the classroom and the profession, lowering anxiety and building what Rico and Pastor (2022) might term "professional reflexes." This immersive repetition in a safe environment directly addresses the common graduate challenge of being unfamiliar with real-world settings, as noted in the literature.

3.2.2. Facilitating Autonomous Learning and Immediate Feedback

The integration of AI tools empowered self-directed learning. Platforms like ChatGPT and

Google Translate served not as answer keys, but as interactive partners for analysis and post-editing. Students could instantly generate translation drafts, critically evaluate their quality, identify errors, and practice refinement strategies. This cycle of draft-feedback-revision, facilitated by AI, provides a density of practice and immediate correction that is logistically impossible for a single instructor to provide to each student individually. It accelerates the learning curve and fosters metacognitive skills, as students learn to assess not just language, but also the output of translation engines - a critical 21st-century skill (O'Hagan, 2022).

3.2.3. Developing Critical Post-Editing and Digital Competence

The experimental intervention directly targeted a major gap in traditional curricula identified in the literature review: digital literacy. By actively using AI for translation tasks, students moved beyond theoretical knowledge about technology to hands-on competency. They began developing essential post-editing skills, learning to efficiently humanize machine output, manage terminology consistency, and make informed choices about when to use AI assistance versus rely on human translation. This transforms them from passive consumers of technology into critical, strategic users, directly enhancing their labor market readiness.

3.2.4. Addressing Limitations and Contextual Factors

It is important to contextualize these positive findings. The study was conducted with a specific cohort of third-year Business and Tourism English majors. The VR materials, while diverse, were primarily from general and entertainment media. Future applications would benefit from incorporating VR simulations of more formal, domain-specific contexts like legal proceedings or technical negotiations to broaden skill transfer. Furthermore, the success of such a model depends heavily on institutional support for technology infrastructure and ongoing instructor training to effectively facilitate these new digital pedagogies.

In conclusion, the discussion affirms that the significant gains of the Experimental Group are not merely a function of using technology, but of its structured pedagogical integration. The model successfully created a more dynamic, responsive, and professionally relevant learning ecosystem. The findings resonate with international studies by scholars like Fantinuoli (2020) and Mellinger & Hanson (2023), while providing concrete, localized evidence for Vietnamese institutions seeking to modernize their T&I programs. This approach effectively bridges the gap between traditional training and the digital demands of the contemporary language industry.

4. Conclusion

This study has presented and empirically validated an innovative pedagogical model for integrating Artificial Intelligence (AI) and Virtual Reality (VR) into Translation and Interpreting (T&I) education. The quantitative results demonstrate conclusively that students taught with this integrated digital approach achieved significantly greater improvements in interpreting and listening performance compared to those following a traditional textbook-based curriculum. The experimental group's 31% score increase underscores the model's effectiveness in enhancing core language competencies through immersive practice, autonomous learning supported by instant AI feedback, and the development of critical digital skills like post-editing.

The research confirms that digital transformation in T&I education is not a peripheral enhancement but a central strategy for addressing longstanding pedagogical gaps. It directly tackles issues of student anxiety, the theory-practice divide, and inadequate preparation for a technology-driven workplace. By simulating real-world environments and incorporating the very tools that define the modern language industry, this model fosters the development of adaptable, confident, and technologically proficient graduates.

For educators and institutions, the implications are clear. A proactive embrace of AI and VR, through systematic curriculum redesign and investment in faculty development, is essential for maintaining the relevance and quality of T&I programs. Future research should explore the long-term impacts of such training on graduate employability and performance, as well as the application of the model to other language pairs and specialized translation domains. Ultimately, this study contributes a feasible, evidence-based framework for harnessing digital transformation to empower the next generation of language professionals ■

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Ứng dụng chuyển đổi số trong giảng dạy và nghiên cứu ngành Ngôn ngữ Anh, chuyên ngành Biên phiên dịch

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Tóm tắt: Sự phát triển nhanh chóng của công nghệ số tạo ra cả cơ hội và thách thức cho giáo dục đại học, đặc biệt trong đào tạo Biên phiên dịch. Nghiên cứu này khảo sát việc ứng dụng Trí tuệ nhân tạo (AI) và Thực tế ảo (VR) nhằm nâng cao hiệu quả giảng dạy và kết quả học tập. Tác giả đề xuất "Mô hình Sư phạm Biên phiên dịch Tăng cường AI và VR", kết hợp các công cụ AI như dịch máy, công cụ hỗ trợ dịch thuật, nhận diện giọng nói với mô phỏng VR các tình huống phiên dịch thực tế. Nghiên cứu thực nghiệm được tiến hành với 60 sinh viên năm ba ngành Ngôn ngữ Anh, chia thành nhóm thực nghiệm và đối chứng trong 10 tuần. Nhóm thực nghiệm được học với sự hỗ trợ của AI và VR, trong khi nhóm đối chứng học theo phương pháp truyền thống. Dữ liệu được phân tích bằng SPSS thông qua bài kiểm tra trước và sau tác động. Kết quả cho thấy nhóm thực nghiệm cải thiện điểm số 31%, cao hơn rõ rệt so với mức tăng 11,2% của nhóm đối chứng. Phát hiện này khẳng định hiệu quả sư phạm của việc tích hợp AI và VR, góp phần giảm lo lắng, tăng phần hứng thú và nâng cao kỹ năng chuyên môn. Nghiên cứu nhấn mạnh tính cần thiết của chuyển đổi số trong đào tạo Biên phiên dịch hiện đại.

Từ khóa: Trí tuệ nhân tạo (AI), Thực tế ảo (VR), Sư phạm Biên phiên dịch, Chuyển đổi số trong giáo dục.